

# Chapter 1

## Perceptron

In order to simplify the Neural Networks' introduction, we are going to describe first what Perceptron is.

The perceptron algorithm for halfspaces.<sup>1</sup>

First, basic definitions:

The class of affine function  $L_d$  is defined as follows:

$$L_d = \{h_{w,d} : w \in \mathbb{R}^d, b \in \mathbb{R}\}$$

Based on a target function and training examples fixed from a specific decision problem.

We define a simple learning model as a : Let define the input space as  $\mathcal{X} = \mathbb{R}^d$  where  $d \in \mathbb{N} - \{0\}$  and  $\mathcal{X}$  the  $d$ -dimensional Euclidian space.

The output space is defining as  $\mathcal{Y} = +1, -1$ .

We specify the hypothesis set  $\mathcal{H} = \{h(\mathbf{x}) = \text{sign}(w^T \mathbf{x} + b) \text{ where } w, \mathbf{x} \in \mathcal{X} \text{ and } b \in \mathbb{R}.$

The weight vector is  $w$  and  $\mathbf{x}$  are the elements from the training set.

The model of  $\mathcal{H}$  is called the *perceptron*.

And an simple example

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<sup>1</sup>A half-space is either of the two parts into which a hyperplane divides a affine space.